therefore, proposed a modified "sandwich" system of training. A student on leaving school will enter the university and will spend a session there, passing the intermediate examination for the B.Sc. degree in engineering at the end; if his record is good, and he is a promising student, he will be recommended to a firm which will allow him to enter its works for a period of fourteen months. This will enable the student to judge to what extent he is fitted for an engineering career, and will also enable the manufacturers to form an impression as to his suitability. He will then return to the university and continue his studies for a further period of two years, in some cases spending the long vacation in the works; after that he will return to the same works, if he has given satisfaction, for another period of fourteen months. A number of firms have already agreed to take part in the experiment, so that a satisfactory trial is assured. The "sandwich" scheme, besides providing an improved method of engineering training, will also, it is hoped, bring the important firms which are taking part in it into closer touch with the University, and thus lead to more co-operation in research and other matters.

SOCIETIES AND ACADEMIES.

MANCHESTER.

Literary and Philosophical Society, October 3.—Prof. S. J. Hickson, president, in the chair.—Prof. F. E. **Weiss**, Sir E. **Rutherford,** W. **Thomson,** and Dr. G. **Hickling**: The discussions at the Newcastle meeting of the British Association.

October 17.—Prof. S. J. Hickson, president, in the chair.—Prof. W. H. **Lang**: *Rhynia Gwynne-Vaughani,* Kidston and Lang, a new type of vascular cryptogam from the Old Red Sandstone of Rhynie, Aberdeenshire. The chert in which the plant occurs was discovered by Dr. Mackie, of Elgin, and the plant remains are being studied by Dr. R. Kidston and Prof. W. H. Lang, the results being published by the Royal Society of Edinburgh. Photographic slides showed the underground rhizomes attached to the peaty soil by rhizoids, the branched cylindrical aerial stems, which were leafless, and the large cylindrical sporangia. The internal structure is well preserved, so that our knowledge of this ancient land plant is pretty complete. Rhynia differs so much from other vascular cryptogams that a new class, the Psilophytales, has been founded to contain it.

PARIS.

Academy of Sciences, October 9.—M. Camille Jordan in the chair.—P. **Puiseux**: The physical libration of the moon, studied on forty photographs obtained at the Paris Observatory between the years 1894 and 1909. The method of measurement and calculation employed is fully described, and the conclusion is drawn that the theory of the movement of the moon round its centre of gravity, established by considering the satellite as an indeformable body, does not correspond with the facts.—D. **Eydoux**: The transmission of strokes of a hydraulic ram in pipes with bifurcations.—F. **Houssay**: The sound of distant cannonades. The complexity of the question. A description of observations made at Sceaux. Heavy cannonades can be heard at distances at which single cannon-shots cannot be detected; there would appear to be a summation effect. —M. **de Broglie**: On a system of absorption bands corresponding to the L-rays of X-ray spectra of the elements, and on the importance of the phenomena of selective absorption in radiography. Commenting on a recent communication by M. Boll and L. Mallet, the author agrees that the radiations emitted by a Coolidge tube are as heterogeneous as those given by other bulbs, and give a relatively complex spectrum. Filtration through a non-selective screen, such as aluminium, may be made to give a roughly monochromatic beam. From a discussion of the action on a silver bromide emulsion, it is shown that a practically monochromatic radiation can be obtained by interposing a selective screen containing a substance (cadmium, antimony) with an atomic weight slightly higher than that of silver.—P. **Nicolardot**: The action of reagents upon French, Bohemian, and German glassware. Glassware for chemical purposes is now made by several firms in France. Some of these glasses have been submitted to the attack of various chemical reagents (water, solutions of hydrochloric acid, ammonia, ammonium chloride, sodium carbonate), comparative tests being carried out under the same conditions with Jena glass, two Bohemian and two Thuringian glasses. The French glasses proved to be equal to the best German glasses. Comparative tests were also carried out on the resistance of the glasses to sudden changes of temperature and to the action of water at temperatures up to 160° C. Complete analyses of the French, Jena, and Bohemian glasses used are given.—A. **Pictet,** L. **Ramseyer,** and O. **Kaiser**: Some hydrocarbons contained in coal. A soft Sarre coal was extracted on the large scale (five and a half tons) with benzene. From the extraction product (0·25 per cent. of the coal) seven unsaturated and seven saturated hydrocarbons were isolated. These have been compared with the hydrocarbons obtained by the distillation of coal at 450° C. in a vacuum, and it is shown that a part, at least, of the hydrocarbons of the vacuum tar exist as such in the coal. The extracted material proved to be optically active, although no fraction from the vacuum tar possessed this property. Hence it would appear that a temperature of 450° is sufficient to racemise the volatile active substances contained in coal. This furnishes a proof that the materials from which the coal has been formed have never been carried to that temperature.—R. **Masse** and H. **Leroux**: The estimation of phenol in crude tar phenols. The process suggested consists of a preliminary fractional distillation, followed by a determination of the melting point.—J. **Bougault**: The semicarbazones of α-ketonic acids. The α-iodocinnamic acids.—G. **Barthelat**: The structure of the floral pedicel of Mesembryanthemum. —M. **Mirande**: The cytological formation of anthocyanin in the living plant.—M. **Molliard**: The disengagement of oxygen arising from the reduction of nitrates by green plants.—Em. **Bourquelot**: Remarks on the rotatory powers of the α- and β-alcohol-*d*-glucosides and alcohol-*d*-galactosides.—J. **Legendre**: The destruction of mosquitoes by fish. It has been proved that the Chinese carp (*Carassius auratus*) flourishes when introduced into the rice plantations of Madagascar, devouring the larvæ of the mosquito in large numbers, thus helping to reduce malaria.—A. **Lumière**: The presence of the tetanus bacillus at the surface of projectiles buried in cicatrised wounds.

BOOKS RECEIVED.

Dyeing in Germany and America, with Notes on Colour Production. By S. H. Higgins. Second edition. Pp. viii+143. (Manchester: University Press; London: Longmans and Co.) 5*s*. net.

Philips' Planisphere showing the Principal Stars Visible for Every Hour in the Year. (London: G. Philip and Son, Ltd.) 1*s*. 6*d*. net.

A Text-Book of Quantitative Chemical Analysis. By Drs. A. C. Cumming and S. A. Kay. Second edition. Pp. xv+402. (London: Gurney and Jackson; Edinburgh: Oliver and Boyd.) 9*s*. net.

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The Camera as Historian. By H. D. Gower, L. S. Jast, and W. W. Topley. Pp. xv+259. (London: Sampson Low and Co., Ltd.) 6*s*. net.

The Biology of Tumours. By Dr. C. M. Moullin. Pp. 55. (London: H. K. Lewis and Co., Ltd.) 2*s*. 6*d*. net.

Insect Enemies. By C. A. Ealand. Pp. 223+plates. (London: Grant Richards, Ltd.) 6*s*. net.

Memoirs of the Geological Survey. Summary of Progress of the Geological Survey of Great Britain and the Museum of Practical Geology for 1915. (London: H.M.S.O.; E. Stanford, Ltd.) 1*s*.

Dynamics. By R. C. Fawdry. Part i. Pp. viii+177+ix. (London: G. Bell and Sons, Ltd.) 3*s*.

Chronicles of Man. By Dr. C. F. Coxwell. Pp. xiv+654. (London: Watts and Co.) 6*s*. net.

Elements of Military Education. By W. A. Brockington. Pp. xvi+363. (London: Longmans and Co.) 4*s*. 6*d*. net.

Crowley's Hygiene of School Life. New edition. By Dr. C. W. Hutt. Pp. xv+428. (London: Methuen and Co., Ltd.) 3*s*. 6*d*. net.

A Hausa Botanical Vocabulary. By J. M. Dalziel. Pp. 119. (London: T. Fisher Unwin, Ltd.) 6*s*. 6*d*. net.

The World's Wonder Stories for Boys and Girls. By A. G. Whyte. Pp. xiv+272. (London: Watts and Co.) 6*s*. net.

DIARY OF SOCIETIES.

THURSDAY, NOVEMBER 2.

ROYAL SOCIETY, at 4.30.—Waves in an Elastic Plate: Prof. H. Lamb.—(1) Multiple Integrals; (2) The Order of Magnitude of the Coefficients of a Fourier Series: Prof. W. H. Young.—A Determination of the Heat of Vaporisation of Water at 100° C. and 1 Atmosphere Pressure in Terms of the Mean Calorie: T. C. Sutton.—The Mechanical Relations of the Energy of Magnetisation: G. H. Livens.

MATHEMATICAL SOCIETY, at 5.30.—Annual General Meeting.—Address of Retiring President: The Fourier Harmonic Analysis; its Practical Scope and its Limitations: Sir Joseph Larmor.—Multiple Integration by Parts and the Second Theorem of the Mean: Prof. W. H. Young.—Moving Axes and their Uses in the Differential Geometry of Euclidean Space: E. H. Neville.—Areas and Conformal Representation: J. Hodgkinson.

CHEMICAL SOCIETY, at 8.—Overvoltage Tables. Part IV. The Theories of Overvoltage and Passivity: E. Newbery.—Studies of the Carbonates. Part II. Hydrolysis of Sodium Carbonate and Bicarbonate, and the Ionisation Constants of Carbonic Acid: C. A. Seyler and P. V. Lloyd.—The Synthesis of Hydroxyquercetin: M. Nierenstein.—(1) The Reaction between Methyl Iodide and some Metallic Cyanides; (2) Some Reactions produced by Mercuric Iodide: E. G. J. Hartley.—The Dual Theory of Acid Catalysis. A Comparison of the Activities of Certain Strong Acids: H. M. Dawson and T. W. Crann.

EUGENICS EDUCATION SOCIETY, at 5.15.—Mental Differences in Children: C. Burt.

FRIDAY, NOVEMBER 3.

INSTITUTION OF MECHANICAL ENGINEERS, at 6.—Thomas Hawksley Lecture: The Gas Engineer of the Last Century: H. E. Jones.

SATURDAY, NOVEMBER 4.

GEOLOGISTS' ASSOCIATION, at 3.—Followed by Annual Conversazione.

MONDAY, NOVEMBER 6.

SOCIETY OF ENGINEERS, at 5.30.—Heating and Ventilating Private Dwelling-Houses: C. T. A. Hanssen.

ARISTOTELIAN SOCIETY, at 8.—Presidential Address: The Problem of Recognition: Dr. H. Wildon Carr.

ROYAL GEOGRAPHICAL SOCIETY, at 8.30.—The Great Passes of the Western and Central Alps: The President.

TUESDAY, NOVEMBER 7.

ZOOLOGICAL SOCIETY, at 5.30.—Two New Species of Cestodes belonging respectively to the Genera Linstowia and Cotugnia: Dr. F. E. Beddard.—Notes on the Development of the Starfishes *Asterias glacialis*, O.F.M., *Cribrella oculata* (Linck), Forbes, *Solaster endeca* (Retzius), Forbes, *Stichaster roseus* (O.F.M.), Sars: Dr. J. F. Gemmill.—Studies on the Anoplura and Mallophaga, being a Report upon a Collection from the Mammals and Birds in the Society's Gardens. II.: B. F. Cummings.—Notes on a Collection of Heterocera made by Mr. W. Feather in British East Africa, 1911–13: Lt.-Col. J. M. Fawcett.—The Structure and Function of the Mouth-parts of the Palæmonid Prawns: L. A. Borradaile.—Heude's Collection of Pigs, Sika, Serows, and Gorals in the Sikawei Museum, Shanghai: A. de C. Sowerby.—The Classification of the Tineinæ, a Subfamily of Moths of the Family Pyralidæ: Sir G. F. Hampson.

INSTITUTION OF CIVIL ENGINEERS, at 5.30.—Address by the President, Sir Maurice Fitzmaurice, and Presentation of Medals awarded by the Council.

MINERALOGICAL SOCIETY, at 5.30.—Humite: Prof. W. J. Lewis.—(1) The Combination of Twin Operations; (2) Modification of the Kohlrausch Method of Determining Refractive Indices: Dr. J. W. Evans.—The Basalts of Hare Island, West Greenland: A. Holmes.

RÖNTGEN SOCIETY, at 8.15.—Presidential Address; Capt. C. Thurstan Holland.

WEDNESDAY, NOVEMBER 8.

FARADAY SOCIETY, at 5.30–7 and 8.30–10.30.—General Discussion on Refractory Materials.—Introductory Address: Sir R. Hadfield.—The Texture of Refractories: Dr. J. W. Mellor.—The Application of Petrographic Methods to the Study of Refractory Materials: Prof. W. G. Fearnsides.—Silica as a Refractory Material: Cosmo Jones.—The Transmission of Heat through Materials Employed in Furnace Construction: Ezer Griffiths.

GEOLOGICAL SOCIETY, at 5.30.

THURSDAY, NOVEMBER 9.

ROYAL SOCIETY, at 4.30.—*Probable Papers*: Methods of Raising a Low Arterial Pressure: Prof. W. M. Bayliss.—Selective Permeability; the Absorption of Phenol and other Solutions by the Seeds of *Hordeum vulgare*: A. J. Brown and F. Tinker.—The Toxic Action of Dilute Pure Sodium Chloride Solutions on the Meningococcus: C. Shearer.—The *Rôle* of the Phagocyte in Cerebro-spinal Meningitis: C. Shearer and H. W. Crowe.—Investigation dealing with the Phenomena of "Clot" Formations. IV. The Diphasic Erosive Action of Salts on the Cholate Gel: S. B. Schryver and Mary Hewlett.—Some Photochemical Experiments with Pure Chlorophyll and their Bearing on Theories of Carbon Assimilation: Ingvar Jorgensen and F. Kidd.

OPTICAL SOCIETY, at 8.—Some Notes on Glass Grinding and Polishing: J. W. French.

ROYAL GEOGRAPHICAL SOCIETY, at 5.—Natural Divisions of England: C. B. Fawcett.

FRIDAY, NOVEMBER 10.

ROYAL ASTRONOMICAL SOCIETY, at 5.

MALACOLOGICAL SOCIETY, at 7.—Has Lymnæa an Auriculoid Ancestry? C. Hedley.—(1) *Anodonta cygnaea*, L., and *A. anatina*, L.; (2) *Pseudanodonta rothomagensis*, Locard: H. H. Bloomer and H. Overton.—Sexual Characters in the Shell and Radula of *Cyclostoma elegans*: Prof. A. E. Boycott.

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